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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,562	01/05/2004	Hae-Seung Lee	16820.P345	2404

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EXAMINER	
CHEN, CHIA WEI A	

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2622	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/751,562	LEE ET AL.	
	Examiner	**Art Unit**	
	Chia-Wei A. Chen	2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 January 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date [redacted]

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The references listed on the Information Disclosure Statement filed on 01/05/2004 and 07/08/2004 have been considered by the examiner (see attached PTO/SB/08).

Specification

1. The disclosure is objected to because of the following informalities: Page 5, line 8 of the specification refers to a Figure 17. There are only 12 figures submitted.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 11-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Kindt et al. (US 6,348,681 B1).

As to claim 11, Kindt et al. teaches, in Figure 5, a method for measuring a sense node voltage associated with a light detecting element (d1), the sense node voltage being related to light intensity incident upon the light detecting element, comprising:

- (a) initiating an integration period for the light-detecting element (col. 9, lines 33-35);
- (b) resetting, a plurality of times, the voltage level of the sense node after initiating the integration period (col. 8, lines 39-43, col. 15, lines 19-50); and

- (c) measuring, only once during the integration period, the sense node voltage generated in response to incident light intensity, the sense node voltage being measured subsequent to the plural resettings of the voltage level of the sense node and prior to initiating a next integration period (col. 6, lines 29-34, col. 11, lines 62-64).

As to claim 12, Kindt et al. teaches the method as claimed in claim 11, wherein the voltage levels associated with the plural resettings of the voltage level of the sense node have voltage values less than a voltage value used to reset the voltage level of the sense node at a beginning of the integration period (col. 12, lines 54-56).

As to claim 13, Kindt et al. teaches the method as claimed in claim 11, wherein a voltage level associated with one of the plural resettings during the integration period is less than a voltage level associated with a previous one of the plural resettings during the integration period (col. 13, lines 45-50, eqs. 32 and 34).

As to claims 14 and 15, Kindt et al. teaches the method as claimed in claim 11, wherein the plural resettings generate a non-periodic pattern (col. 13, lines 41-46) and wherein the plural resettings generate a periodic pattern (col. 13, lines 41-46). (The timings of XDR reset pulses are user designed and programmable. Tx1, Tx2, and Tx3 may be programmed and calculated according to equations 28-34. The user can decide to make the pulses either periodic or non-periodic.)

As to claim 16, Kindt et al. teaches, in Figure 5, a method for capturing a frame of image data associated with a scene using an array of light-detecting elements, each light-detecting element having an associated sense node (col. 7, lines 64-65), comprising:

- (a) initiating an integration period for the array of light-detecting elements, the integration period being associated with the frame of image data (col. 9, lines 33-35);
- (b) generating a plurality of intra-period reset pulses during the integration period such that voltage levels of the sense nodes associated with a portion of the array of light-detecting elements are enabled to be set a plurality of times during the integration period (col. 8, lines 39-43, col. 15, lines 19-50); and
- (c) measuring, only once during the integration period, the voltage levels of the sense nodes voltages generated in response to incident light intensities, the sense node voltages being measured subsequent to a final resetting of the voltage levels of the sense nodes associated with the portion of the array of light-detecting elements and prior to initiating a next integration period (col. 11, lines 62-64, col. 6, lines 29-34).

As to claim 17, Kindt et al. teaches the method as claimed in claim 16, wherein the voltage levels associated with the plurality of intra-period reset pulses have voltage values less than a voltage value used to reset the voltage levels of all the sense nodes at a beginning of the integration period (col. 12, lines 54-56 and eqs. 28-34).

As to claim 18, Kindt et al. teaches the method as claimed in claim 16, wherein a voltage level associated with the plurality of intra-period reset pulses during the integration period is less than a voltage level associated with a previous one of the plurality of reset pulses during the integration period (col. 15, lines 45-50 and eqs. 28-34).

As to claim 19, Kindt et al. teaches the method as claimed in claim 16, wherein the voltages levels associated with the plurality of intra-period reset pulses during the integration period progressively decrease during the integration period (col. 15, lines 45-50 and eqs. 28-34).

As to claim 20, Kindt et al. teaches the method as claimed in claim 16, further comprising: (d) resetting a voltage level of the sense node when the voltage level of the sense node is less than the voltage value associated with the generated reset pulse (Fig. 3, col. 4, lines 13-17, col. 13, lines 15-20).

As to claim 21, Kindt et al. teaches, in Figure 5, a method for measuring a sense node voltage associated with a light detecting element (d1), the sense node voltage being related to light intensity incident upon the light detecting element, comprising:

- (a) initiating an integration period for the light-detecting element (col. 9, lines 33-35);

- (b) resetting, a first number of times during the integration period, the voltage level of the sense node after initiating the integration period (col. 8, lines 39-43, col. 15, lines 19-50); and
- (c) measuring the sense node voltage generated in response to incident light intensity, the sense node voltage being measured a second number of times during the integration period, the second number of times being less than the first number of times (col. 6, lines 29-34, col. 11, lines 62-64).

As to claim 22, Kindt et al. teaches the method as claimed in claim 21, wherein the voltage level associated with resetting of the voltage level of the sense node has a voltage value less than a voltage value used to reset the voltage level of the sense node at a beginning of the integration period (col. 12, lines 54-56).

As to claim 23, Kindt et al. teaches the method as claimed in claim 21, wherein the first number of times is greater than one and wherein a voltage level associated with one of the plural resettings during the integration period is less than a voltage level associated with a previous one of the plural resettings during the integration period (col. 10, lines 10-12, col. 15, lines 45-50, eqs. 32 and 34).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-10, 24-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kindt et al. (US 6,348,681 B1).

As to claim 1, Kindt et al. discloses, in Figure 5, a method for measuring a sense node voltage associated with a light-detecting element (d1), the sense node voltage being related to light intensity incident upon the light-detecting element:

- (a) generating a first integration reset pulse to enable a resetting of the sense node voltage to a voltage value substantially equal to a reset voltage value associated with the first integration reset pulse, an edge of the first integration reset pulse triggering a beginning of a first integration period (col. 9, lines 33-35);
- (c) generating, subsequent to the generation of the first integration reset pulse and prior to the generation of the second integration reset pulse, a plurality of intra-period reset pulses (XDR reset pulses) to enable resetting of the sense node voltage to a plurality of voltage values, each voltage value being substantially equal to a reset voltage value associated with the generated intra-period reset pulse (col. 8, lines 39-43, col. 15, lines 1950); and
- (d) measuring, only once during an integration period, the sense node voltage generated in response to incident light intensity, the sense node voltage being measured subsequent to the generation of the plurality of intra-period reset pulses

and prior to the generation of the second integration reset pulse (col. 11, lines 62-64, col. 6, lines 29-34);

but does not specifically teach:

- (b) generating a second integration reset pulse to enable a resetting of the sense node voltage to a voltage value substantially equal to a reset voltage value associated with the second integration reset pulse, an edge of the second integration reset pulse triggering a beginning of a second integration period;

The Description of the Related Art of the same document, Kindt et al., specifically teaches:

- (b) generating a second integration reset pulse to enable a resetting of the sense node voltage to a voltage value substantially equal to a reset voltage value associated with the second integration reset pulse, an edge of the second integration reset pulse triggering a beginning of a second integration period (col. 3, lines 10-14);

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the second integration reset pulse in the Description of the Related Art of Kindt et al. with the intra-period reset pulses taught in the body of the invention of Kindt et al. to allow implementation of the Extended Dynamic Range (XDR) technique using simpler circuitry using only a single set of CDS circuits and to not require circuitry for combining the outputs of two sets of CDS circuits (see col. 6, lines 29-34 of Kindt et al.).

As to claim 2, Kindt et al. teaches the method as claimed in claim 1, wherein the reset voltage values associated with the plurality of intra-period reset pulses are less than the reset voltage value associated with the first integration reset pulse (voltages Ux1, Ux2, Ux3; col. 12, lines 54-56, col. 15, lines 18-50).

As to claim 3, Kindt et al. teaches the method as claimed in claim 2, wherein the reset voltage value associated with one of the plurality of intra-period reset pulses is less than the reset voltage value associated with a previous one of the plurality of intra-period reset pulses (voltages Ux1 and Ux2, col. 10, lines 10-12, col. 15, lines 45-50, eqs. 32 and 34)

As to claims 4-9, Kindt et al. teaches the methods as claimed in claims 1-3, wherein the generation of the plurality of intra-period reset pulses is non-periodic (col. 13, lines 41-46) and wherein the generation of the plurality of intra-period pulses is periodic (col. 13, lines 41-46). (The timings of XDR reset pulses are user designed and programmable. Tx1, Tx2, and Tx3 may be programmed and calculated according to equations 28-34. The user can decide to make the pulses either periodic or non-periodic.)

As to claim 10, Kindt et al. teaches the method as claimed in claim 1, further comprising: (e) resetting a voltage level of the sense node when the voltage level of the sense node is less than the voltage value associated with the generated intra-period reset pulse (col. 13, lines 15-20).

As to claim 24, Kindt et al. teaches a method for measuring a sense node voltage associated with a light-detecting element (d1), the sense node voltage being related to light intensity incident upon the light-detecting element, the light-detecting element having a reset switch associated therewith so as to set a voltage level of the sense node (col. 2, lines 46-50), comprising:

- (a) generating a first integration reset pulse to enable a resetting of the sense node voltage to a voltage value substantially equal to a reset voltage value associated with the first integration reset pulse, an edge of the first integration reset pulse triggering a beginning of a first integration period (col. 9, lines 33-35);
- (c) generating, subsequent to the generation of the first integration reset pulse and prior to the generation of the second integration reset pulse, a train of progressively decreasing intra-period reset pulses to enable resetting of the sense node voltage to a plurality of voltage values, each voltage value being substantially equal to a reset voltage value associated with the generated intra-period reset pulse (col. 8, lines 39-43, col. 15, lines 19-50); and
- (d) measuring, only once during an integration period, the sense node voltage generated in response to incident light intensity, the sense node voltage being measured subsequent to the generation of the train of progressively decreasing intra-period reset pulses and prior to the generation of the second integration reset pulse (col. 11, lines 62-64, col. 6, lines 29-34);

but does not specifically teach:

- (b) generating a second integration reset pulse to enable a resetting of the sense node voltage to a voltage value substantially equal to a reset voltage value associated with the second integration reset pulse, an edge of the second integration reset pulse triggering a beginning of a second integration period;

The Description of the Related Art of the same document, Kindt et al., specifically teaches:

- (b) generating a second integration reset pulse to enable a resetting of the sense node voltage to a voltage value substantially equal to a reset voltage value associated with the second integration reset pulse, an edge of the second integration reset pulse triggering a beginning of a second integration period (col. 3, lines 10-14);

As to claim 25, Kindt et al. teaches the method as claimed in claim 24, wherein the train of progressively decreasing intra-period reset pulses progressively decreases in pulse width (col. 13, lines 40-62). (Pulse times are programmable and user defined.)

As to claims 26 and 27, Kindt et al. teaches the methods as claimed in claims 24 and 25, wherein the train of progressively decreasing intra-period reset pulses progressively decreases in voltage level (col. 15, lines 45-50, eqs. 32, 34).

As to claims 28 and 29, Kindt et al. teaches the method as claimed in claim 24, wherein the train of progressively decreasing intra-period reset pulses represents a non-periodic

pattern (col. 13, lines 41-46) and wherein the train of progressively decreasing intra-period reset pulses represents a periodic pattern (col. 13, lines 41-46). (The timings of XDR reset pulses are user designed and programmable. Tx1, Tx2, and Tx3 may be programmed and calculated according to equations 28-34. The user can decide to make the pulses either periodic or non-periodic.)

As to claim 30, Kindt et al. teaches the method as claimed in claim 24, further comprising: (e) resetting a voltage level of the sense node when the voltage level of the of the sense node is less than the voltage value associated with the generated intra-period reset pulse (Fig. 3, col. 4, lines 13-17, col. 13, lines 15-20).

As to claims 31-40, these claims differ only in that the plurality of intra-period reset pulses selectively reset (col. 13, lines 15-20) the sense node voltage to a plurality of voltage values. Thus, claims 31-40 are analyzed as previously discussed in claims 1-10.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Levine et al. (US 6,040,570) discloses an extended dynamic range image sensor system.

Levine et al. (US 6,441,852 B1) discloses an extended dynamic range image sensor system.

Ahn et al. (US 2003/0174226 A1) discloses an image sensor capable of controlling reset voltage automatically and control method thereof.

Decker et al. discloses A 256 x 256 CMOS Imaging Array with Wide Dynamic Range Pixels and Column-Parallel Digital Output (IEEE Journal of Solid-State Circuits, vol. 33, No. 12, Dec. 1998, pp. 2081-2091).

Inquiries

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chia-Wei A. Chen whose telephone number is 571-270-1707. The examiner can normally be reached on Monday - Friday, 7:30 - 17:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NgocYen Vu can be reached on (571) 272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

cc
7/31/07

NGOC-YEN VU
SUPERVISORY PATENT EXAMINER